



# Style Verification

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## Introduction

- Forgery is a problem in the art community.
- To identify a forged artwork we want to compare a pair of paintings and determine whether they were made by the same artist.
- Can we do this by combining the concepts of face verification and neural style transfer?

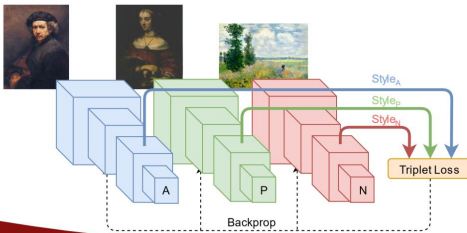
## Dataset

- Kaggle competition "Painter by Numbers" [1].
- 70 000 color images of paintings.
- 1 500 different artists.
- Images were resized to 3x224x224.



## Approach

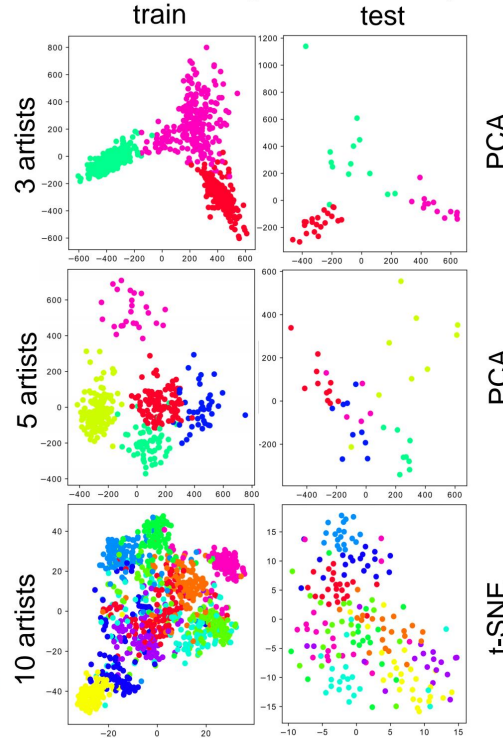
1. Form triplets of images (Anchor, Positive, Negative)
2. Feed through siamese pretrained CNNs (VGG19) and extract style encodings (Gram matrices) from selected layers.
3. Train the network further on triplet loss of the style encodings.



## Results

Three different experiments of increasing complexity:

### Dimensionality reduction of style



## Performance

# artists	train AUC	test AUC
3	0.976	0.963
5	0.974	0.833
10	0.700	0.633

## Discussion

- Promising results with a limited number of artists.
- Generalizability to unknown artists and bigger scale needs further exploration.
- For this project, triplets were random. Results would likely improve with carefully selected triplets.

## Future Work

- Given clusters of training data, is there a better method than k-means for evaluating on a pair of images? Is there a way to generalize to unseen artists?
- If possible, finding a way to algorithmically generate hard triplets would likely give better results.
- How well does this method perform on very challenging examples (e.g. an original and a good forgery)?
- Can this approach give us a deeper understanding of in which sense the Gram matrix represents style?

## References

- [1] Kiri Nichol, "Painter by Numbers — Kaggle," 2016. [Online]. Available: <https://www.kaggle.com/c/painter-by-numbers>

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